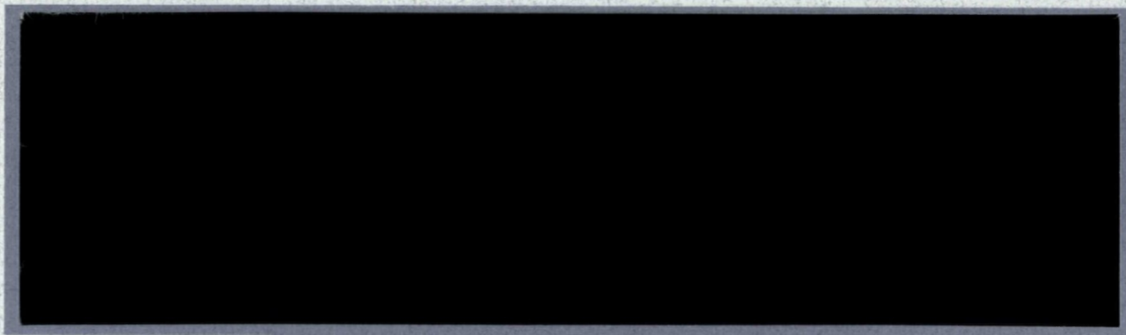


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Final



LANDAU ASSOCIATES, INC.

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Final Health and Safety Plan
Phase II Remedial Design/Remedial Action
Colbert Landfill
Spokane, Washington

8/17/92

August 17, 1992

RECEIVED
AUG 19 1992
SUPERFUND

Prepared for
Spokane County, Washington

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EMERGENCY FACILITIES AND NUMBERS

HOSPITAL: - Holy Family Hospital, N. 5633 Lidgerwood Street, Spokane, WA 99207
Emergency: (509) 482-2460
Information: (509) 482-0111

DIRECTIONS - Drive to Highway 2 (Highway 2 runs north and south between the Little Spokane River and Chattaroy Road). Drive south on Highway 2 toward Spokane and follow through town (turns into Division Street). Get in the far left lane. Turn left at Central Avenue (at Perkins Restaurant). Drive one block and take a right on Lidgerwood Street. Follow signs to the emergency entrance. See map (Figure 1) on next page for emergency route.

TELEPHONE - A telephone will be located onsite in the project office trailer.

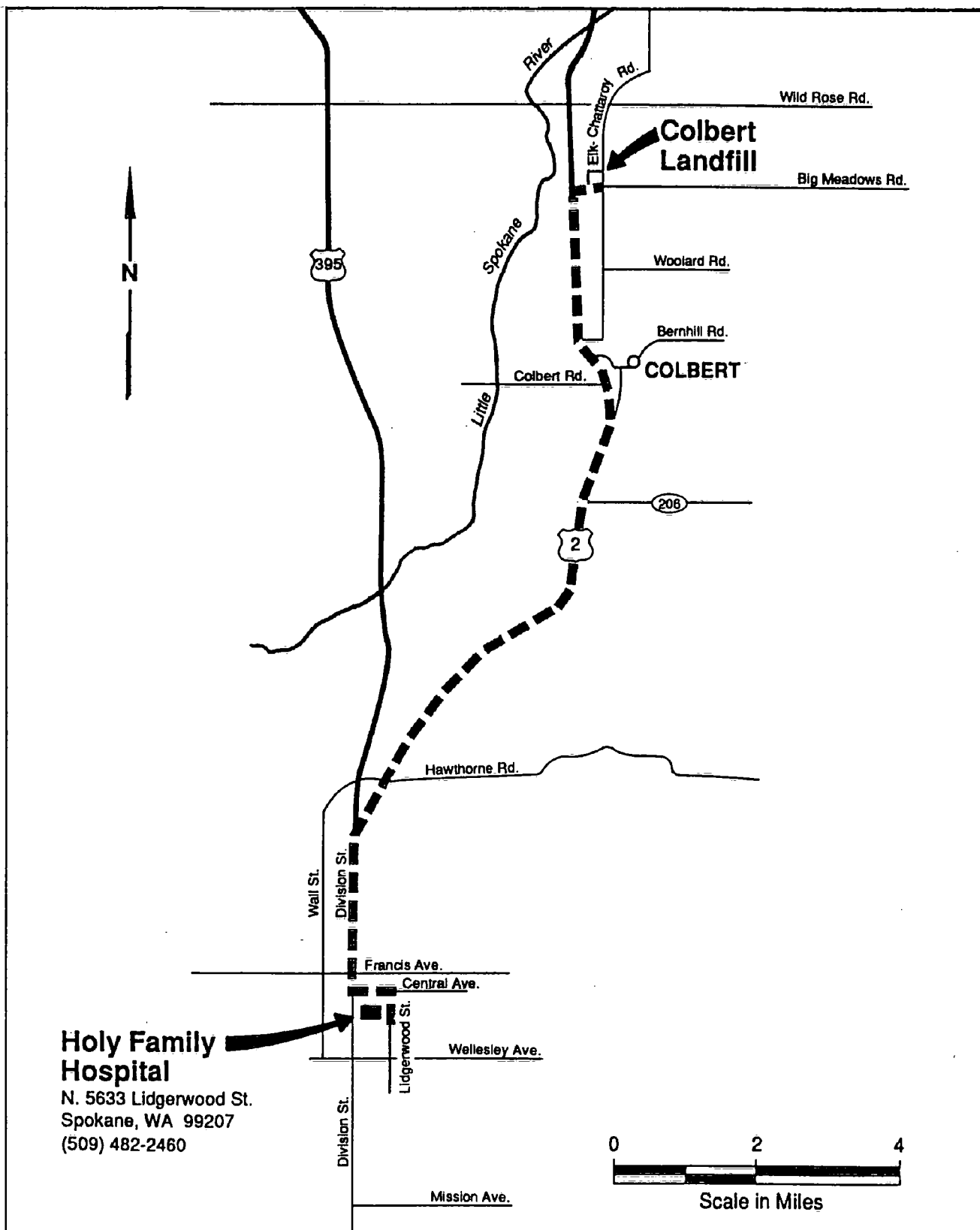
EMERGENCY TRANSPORTATION SYSTEMS (Fire, Police, Ambulance) - 911

EMERGENCY CONTACTS

Fire District #4	911
Holy Family Hospital	(509) 482-2460
Ambulance Service	911
Sheriff's Desk	(509) 456-2240
Washington State Department of Ecology	(509) 456-2926
EPA Region 10 (Environmental Emergencies)	(206) 553-1263
Poison Center	1-800-572-5842

In the event of an emergency, do the following:

1. Call 911 for help as soon as possible. Give the following information:
 - **WHERE** the emergency is - the Colbert Landfill is located at the northwestern quadrant of the intersection of Elk-Chattaroy, Yale, and Big Meadows Roads.
 - **PHONE NUMBER** you are calling from.
 - **WHAT HAPPENED** - type of injury.
 - **WHAT** is being done for the victim(s).
 - **YOU HANG UP LAST** - let the person you called hang up first.
2. If the victim can be moved, transport the individual to the hospital while one person calls the hospital to notify them. If the injury or exposure is not life threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a blanket or sheet of plastic prior to transport.
3. Notify the Site Safety Officer/Field Coordinator and the Project Manager.



DIRECTIONS: Drive to Highway 2 (Highway 2 runs north and south between the Little Spokane River and Chattaroy Road). Drive south on Highway 2 toward Spokane and follow through town (turns into Division St.). Get in the far left lane. Turn left at Central Avenue (at Perkins Restaurant). Drive one block and take a right on Lidgerwood Street. Follow signs to the emergency entrance.



Route to Holy Family Hospital

Figure 1

1.0 INTRODUCTION

This document presents the Health and Safety Plan for Phase II Remedial Design/ Remedial Action (RD/RA) activities (Plan) to be conducted as part of the Colbert Landfill Superfund Project (Project). The Health and Safety Plan contains a description of the Project background and existing site conditions, and establishes health and safety requirements to be followed during Project Phase II RD/RA activities. This Plan addresses only those health and safety procedures and requirements relevant to Phase II construction activities, which include construction of the groundwater extraction, treatment, and discharge systems provided for in the Consent Decree Scope of Work (SOW), and associated groundwater monitoring system expansion. Health and safety procedures and requirements relevant to long-term operation of these systems will be addressed in the operations and maintenance plans, to be submitted with the Phase II plans and specifications.

The Plan covers activities regulated by 29 CFR 1926 (Federal safety and health regulations for construction) or WAC 296-155 (State safety standards for construction work), and includes Phase II criteria for hazard and risk evaluation, Project health and safety organization, air monitoring procedures, descriptions of levels of personal protection and required equipment, decontamination procedures, safety rules and procedures, emergency information, training requirements, and requirements for routine health care and health monitoring.

This Plan has been prepared by Landau Associates, Inc. (Landau Associates), Spokane County's engineering consultant for design of the Colbert Landfill Remedial Action. In addition to those references cited in the text of this Plan, several general references were also used in its preparation. These include: American Conference of Governmental Industrial Hygienists (1990), American Red Cross (1987), NIOSH/OSHA/USCG/EPA (1990), Sax (1989), and Sittig (1985).

1.1 PROJECT BACKGROUND

The Colbert Landfill (Landfill) is an inactive 40-acre municipal solid waste landfill located approximately 15 miles north-northeast of Spokane, WA, and 2.5 miles north of Colbert, WA, as shown on the Regional Location Map (Figure 1.1). The Landfill operated until 1986, when it became filled to capacity with municipal and commercial waste.

Groundwater in the vicinity of the Landfill is contaminated with chlorinated organic solvents. At least a portion of this contamination has been traced to spent solvents that were

disposed of at the Landfill. Solvents were reportedly disposed of at an average rate of several hundred gallons per month for a number of years, and consisted primarily of 1,1,1-trichloroethane (TCA) and methylene chloride (MC). Other organic solvents were also detected in groundwater near the Landfill, including trichloroethylene (TCE), tetrachloroethylene (PCE), 1,1-dichloroethylene (DCE), and 1,1-dichloroethane (DCA). These six chlorinated organic solvents are referred to as the "Constituents of Concern."

A remedial investigation (RI) conducted by Golder Associates (1987a) determined that the two primary aquifers in the Landfill vicinity (the Upper and Lower Sand/Gravel Aquifers), and a low-productivity aquifer to the east of the Landfill (Weathered Latah/Basalt Aquifer) are contaminated with some or all of the Constituents of Concern previously described. A feasibility study (FS) conducted by Golder Associates (1987b) recommended a pump and treat remedy to address this groundwater contamination.

The U.S. Environmental Protection Agency (EPA) released its Colbert Landfill Record of Decision (ROD) for public comment in September 1987 (EPA 1987). The remedial action site (Site) is defined in the ROD as the area of potential impact surrounding and including the Landfill, as shown on Figure 1.1. Based on recommendations in the FS, the ROD specifies that a performance-based groundwater pump and treat system be used to meet ROD-specified Project performance criteria for the Constituents of Concern (Performance Standards). These Performance Standards establish the level of treatment for extracted groundwater and define the maximum constituent concentrations that must be achieved for completion of the remedial action. The ROD, while requiring a pump and treat remedy, allows flexibility in the system's design and configuration. The pump and treat system to be implemented in Phase II is described briefly in Section 1.2 of this plan.

Subsequent to implementation of the ROD, a Consent Decree for the Colbert Landfill (U.S. District Court 1988) was negotiated between the EPA and the Washington State Department of Ecology (Ecology) (as Government Plaintiffs), and Spokane County (County) and Key Tronic Corporation (Key Tronic) (as Potentially Responsible Parties). By this action, the County agreed to implement the EPA-selected remedy in accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) requirements and the State of Washington Hazardous Waste Cleanup Act, codified as Chapter 70.105B RCW.

It was recognized during development of the Consent Decree that available data were inadequate to design the selected remedial action. Consequently, the remedial action is being implemented in phases. Phase I activities included additional characterization of groundwater

contaminant distribution and hydrogeology at the Site, and development of engineering parameters needed for design of the final (Phase II) remedial action. During Phase I, only groundwater samples were analyzed for contaminants; soil samples were analyzed for physical properties only to support hydrogeologic characterization. The design, construction, and operation of the final remedial action will be accomplished during Phase II.

Phase I activities were completed in July 1991, and Phase I results are provided in the Final Phase I Engineering Report (Landau Associates 1991). Phase II health and safety considerations are largely based on the data collected and observations made during Phase I.

1.2 REMEDIAL ACTION DESCRIPTION

This Health and Safety Plan has been prepared to address Phase II construction associated with the groundwater pump and treat remedial action specified in the ROD. The remedial action is subdivided into the following three systems: 1) the groundwater extraction system, 2) the groundwater treatment system, and 3) the discharge system. The groundwater extraction system is comprised of three subsystems:

- The South Interception System, which will consist of a series of extraction wells installed to intercept the contaminant plume in the Upper Sand/Gravel Aquifer
- The West Interception System, which will consist of a series of extraction wells installed to intercept the contaminant plume in the Lower Sand/Gravel Aquifer
- The East Extraction System, which will consist of extraction wells installed in the Lower Sand/Gravel and Latah/Basalt Aquifers near the Landfill for source control.

Extracted groundwater will be pumped via a subsurface piping system to the treatment system, which will be designed to reduce Constituents of Concern in the extracted groundwater to ROD-specified Performance Standards. Air stripping has been identified as the method of treatment. After treatment, water will be discharged to the Little Spokane River (from all systems) via a tight line discharge system. A conceptual design for the Phase II remedial action, presented in the Phase I Engineering Report (Landau Associates 1991), is shown on Figure 1.2.

1.3 SITE CONDITIONS

The Colbert Landfill Site (as designated in the ROD) is approximately 6,800 acres in area and is located entirely within the drainage basin of the Little Spokane River. The Site extends north of the Landfill about ½-mile, west about 1 mile to the Little Spokane River, east a similar distance, and south approximately 5 miles to Peone (or Deadman) Creek, as shown on Figure 1.1.

The Landfill is located on a plateau that is bounded on the west by a steep slope descending toward the Little Spokane River and on the east by low granite and basalt hills. Surface drainage is to the west, towards the Little Spokane River.

The climate is characteristic of eastern Washington, with temperatures ranging from typical average summer highs of about 83°F to average winter lows of around 23°F. The relatively low annual precipitation of approximately 17 inches falls mainly during the winter months of November through February (NOAA 1985).

The geology of the Landfill area consists of a series of glacially and fluvially-derived materials deposited on an eroded landscape of clays, basaltic lava flows, and granitic bedrock. Groundwater in the area is primarily obtained from the Upper and Lower Sand/Gravel Aquifers, which have become contaminated by the Constituents of Concern. The remedial action is focusing on the extraction and treatment of contaminated groundwater from these two aquifers. The approximate extent of groundwater contamination is shown on Figures 1.3 and 1.4 for the upper and lower aquifers, respectively. The locations for existing and proposed Phase II monitoring and extraction wells are provided on Figure 1.5.

A detailed description of hydrogeologic conditions for the Landfill vicinity is presented in the Phase I Engineering Report (Landau Associates 1991).

1.4 HEALTH AND SAFETY PLAN PURPOSE, APPLICABILITY, AND ADHERENCE

This Plan describes specific responsibilities, training, protective equipment, and operating procedures required for Phase II RD/RA construction activities. Modifications, where appropriate, may be made to this Plan to address specific activities.

This Plan applies to all personnel onsite. Contractors, subcontractors, regulatory agency representatives, and visitors entering the Project work zones must adhere to the requirements of this Plan by adoption, or use another plan which meets the minimum requirements established by this Plan.

All individuals must read this Plan prior to participation in intrusive field work⁽¹⁾. If any information presented in this plan is unclear, the reader must contact the Site Safety Officer/Field Coordinator or the Field Construction Project Manager (Project Manager) for clarification prior to participating in any intrusive field activity. Once the information has been read and understood, the individual must sign the ACKNOWLEDGMENT (Form 1.1), and the signed form will be placed in the Project file. Before any intrusive activities are conducted under this work phase, a training session will be conducted to familiarize personnel with Project health and safety procedures, including a discussion of safety issues pertinent to the area of work (see Section 10).

This Plan is flexible and allows unanticipated site-specific problems to be addressed, while providing adequate and suitable worker protection. The Plan may be modified at any time, based on the judgment of the Site Safety Officer/Field Coordinator and the Project Manager. Any modification will be presented to the onsite team during a safety briefing and documented using Form 1.2. Team members will sign this form, and the original will be attached to the Plan copy maintained in the Project file. Copies will be attached to the Plan in the Project office trailer and in each field team vehicle.

1.5 RESPONSIBLE INDIVIDUALS

The Project Manager, the Site Safety Officer, and the Field Coordinator will have primary responsibility for health and safety during Phase II field investigations. Any one of these individuals may temporarily suspend an investigation if there appears to be a threat to health or safety. The Site Safety Officer, Field Coordinator, or a qualified designee (approved by the Site Safety Officer) will be present at all times during intrusive activities. The Site Safety Officer and Field Coordinator will be adequately trained (before site work begins) to meet MISHA and OSHA minimum training requirements. The responsibilities of the Site Safety Officer and Field Coordinator will likely be fulfilled by one person. Therefore, while the responsibilities of each position are discussed separately in the description of safety-related responsibilities presented below in this section, the remainder of the Plan will treat the two positions as one (Site Safety Officer/Field Officer).

(1) For the purpose of this Plan, intrusive activities is defined as any subsurface work accomplished in an area and at a depth where contamination may reasonably be expected to be present.

1.5.1 Project Manager

The Project Manager has responsibility over all Project safety policies, planning, and execution. The Project Manager will be responsible for making project-level decisions regarding safety rules and operations in consultation with the Site Safety Officer/Field Coordinator.

1.5.2 Site Safety Officer

The Site Safety Officer will conduct the initial orientation training and will be the main point of contact on Project health and safety issues. He/she will be present onsite, intermittently, throughout the Project, and will periodically audit safety at the Site. The Site Safety Officer shall:

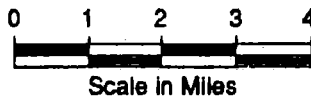
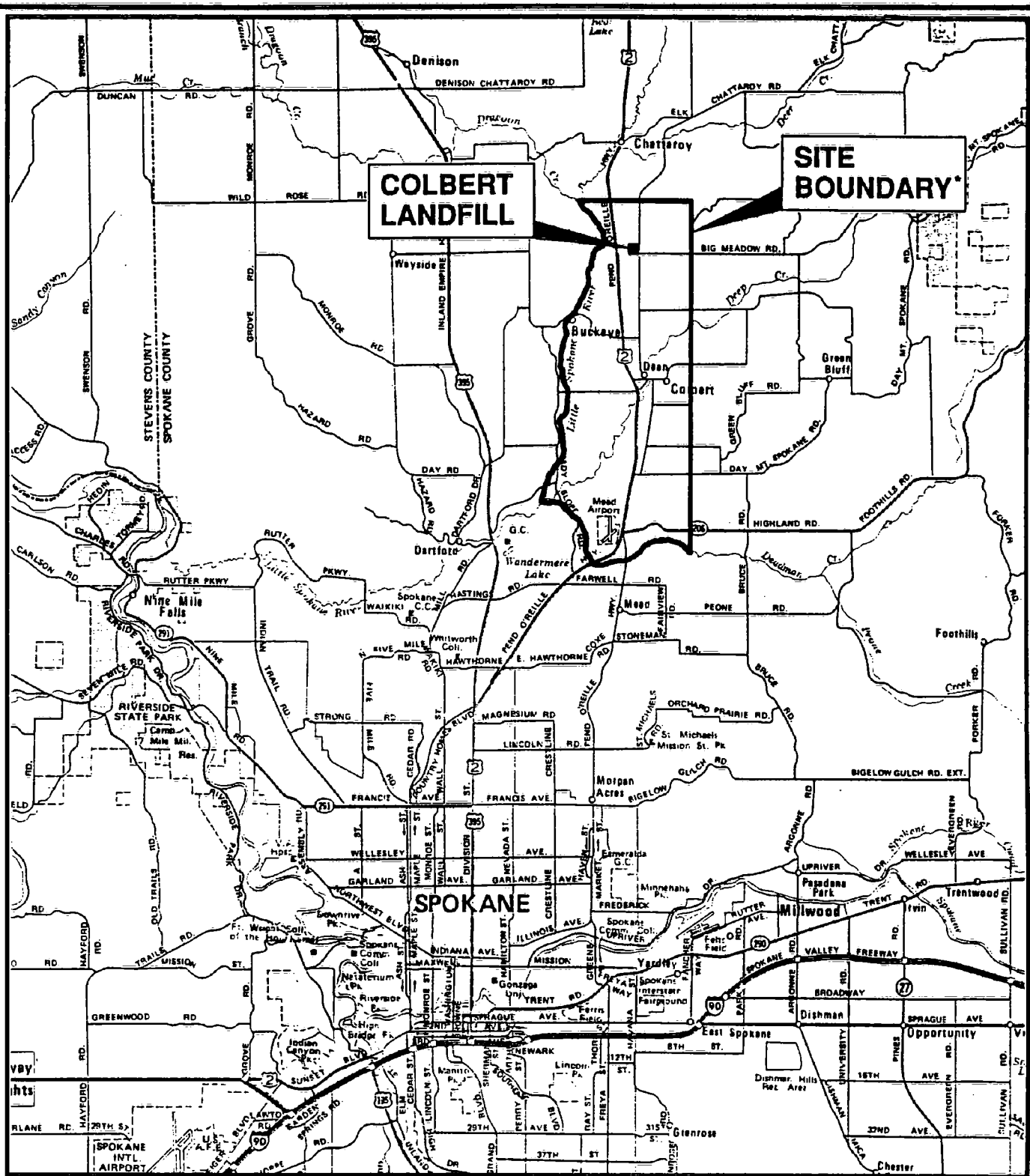
- Ensure that personnel are aware of the provisions of this plan, are instructed in safe work practices, and understand the planned procedures for dealing with onsite emergencies
- Inform personnel of the potential hazards associated with onsite operations
- Determine personal protection levels, necessary clothing, and equipment
- Correct any work practices or conditions that may result in injury to personnel or exposure to hazardous substances
- Verify that appropriate personal protective equipment is properly used by all employees at the start of the project and periodically thereafter
- Coordinate monitoring of organic vapors and explosive gases by field personnel (where applicable).

1.5.3 Field Coordinator

The Field Coordinator is responsible for all day-to-day activities, including implementation of the Plan. The Field Coordinator will implement the Plan as written, or consult with the Site Safety Officer (if separate positions) where alternatives or assistance may be desirable or necessary. The Field Coordinator will notify the Site Safety Officer (if separate positions) of any unanticipated conditions that arise so that any necessary modifications can be made to the Plan. Field team members will report suspect or unfamiliar conditions to the Field Coordinator. The Field Coordinator shall:

- Evaluate weather and hazard information and make any necessary modifications to work plans and personal protection levels to maintain personnel safety

- Ensure that appropriate personal protection equipment is available and properly utilized by all employees
- Ensure that contractors, subcontractors, regulatory agency representatives, and site visitors planning to enter the industrial work zone, exclusion zone, or the contamination reduction zone (described in Section 3.0) read this plan and sign a form acknowledging that either this plan becomes their own or they will adhere to the minimum standards of this plan.



* As specified in the ROD (EPA 1987)



Regional Location Map

Figure 1.1

LANDAU ASSOCIATES, INC.

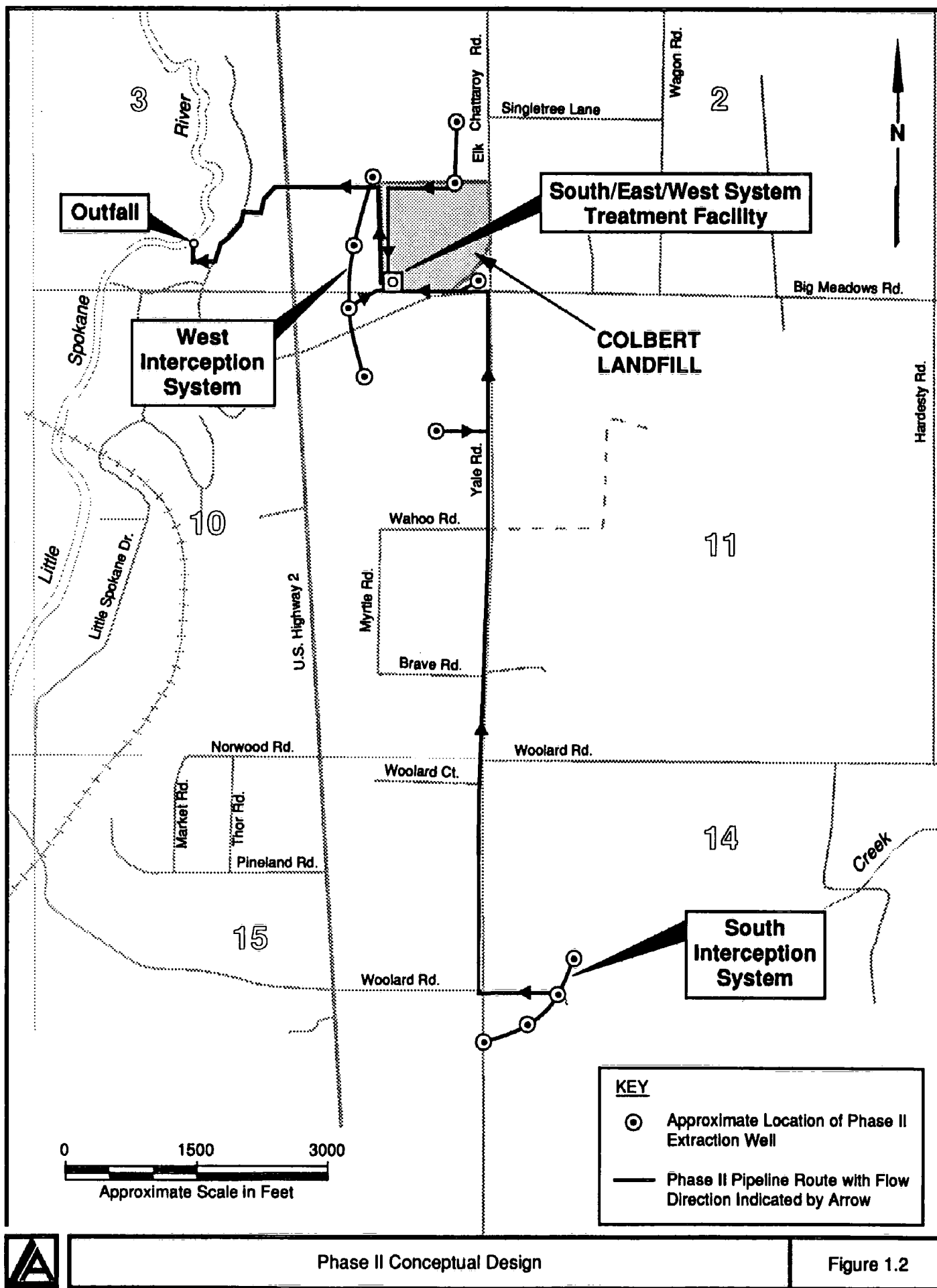
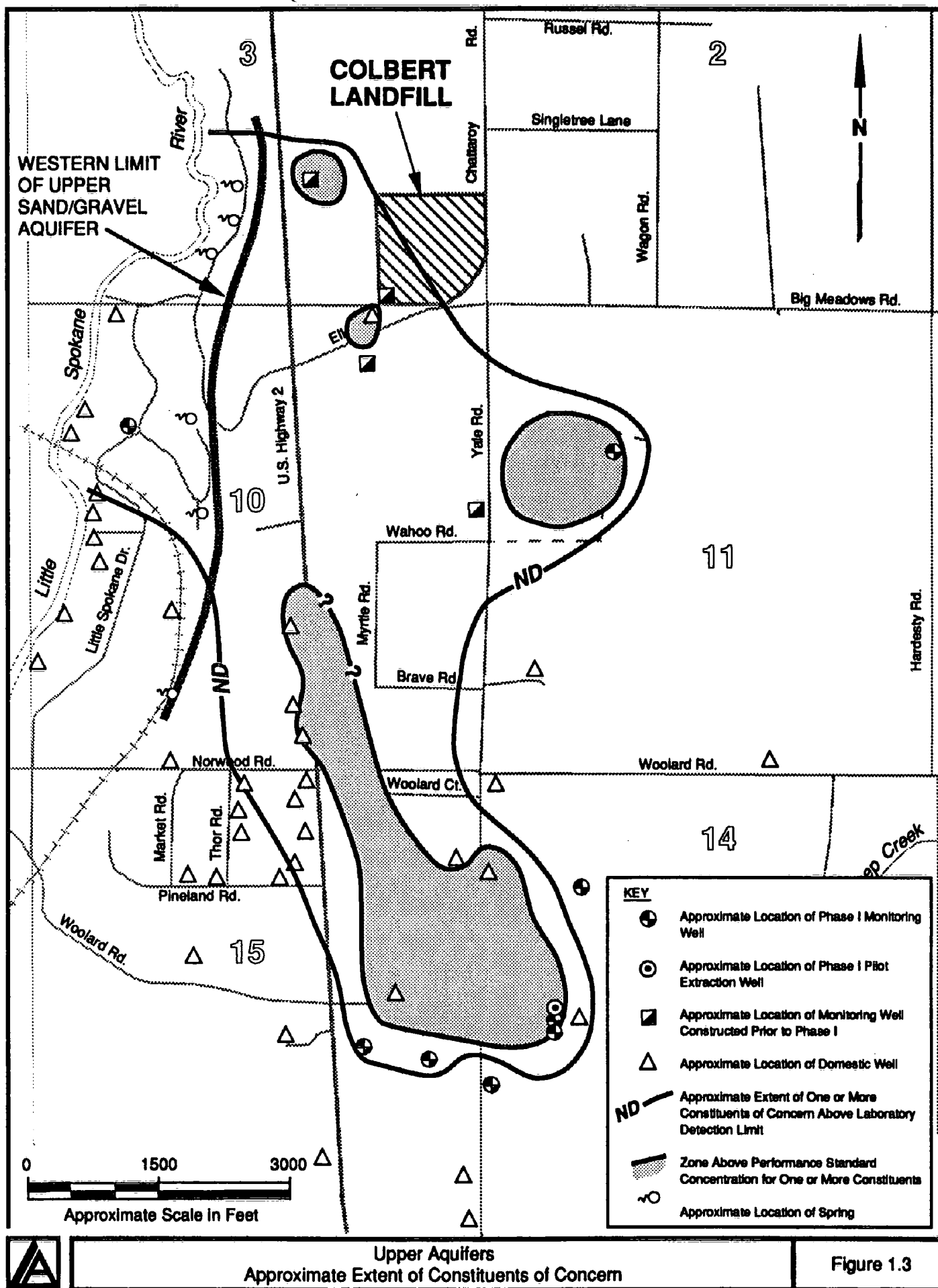
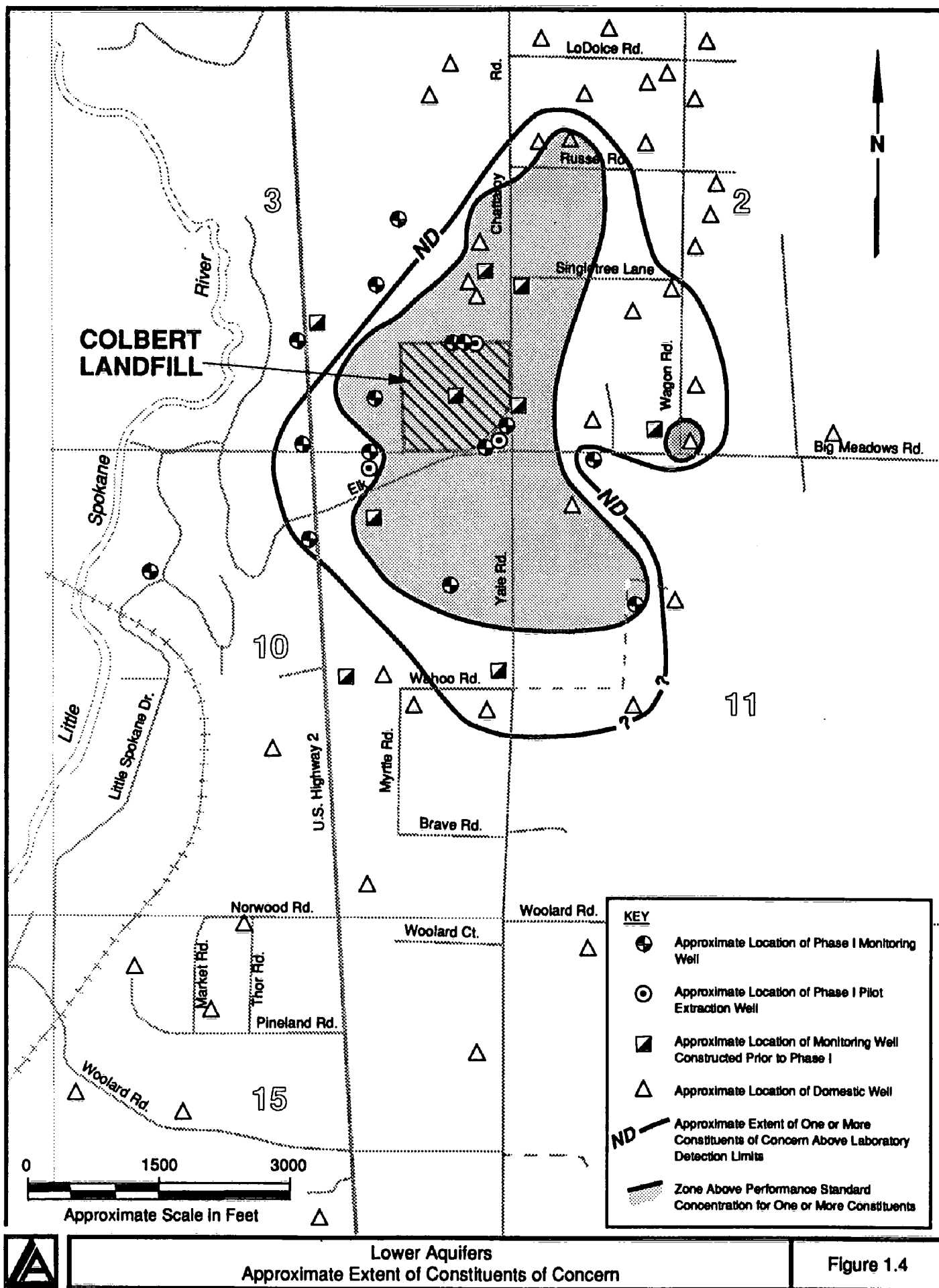
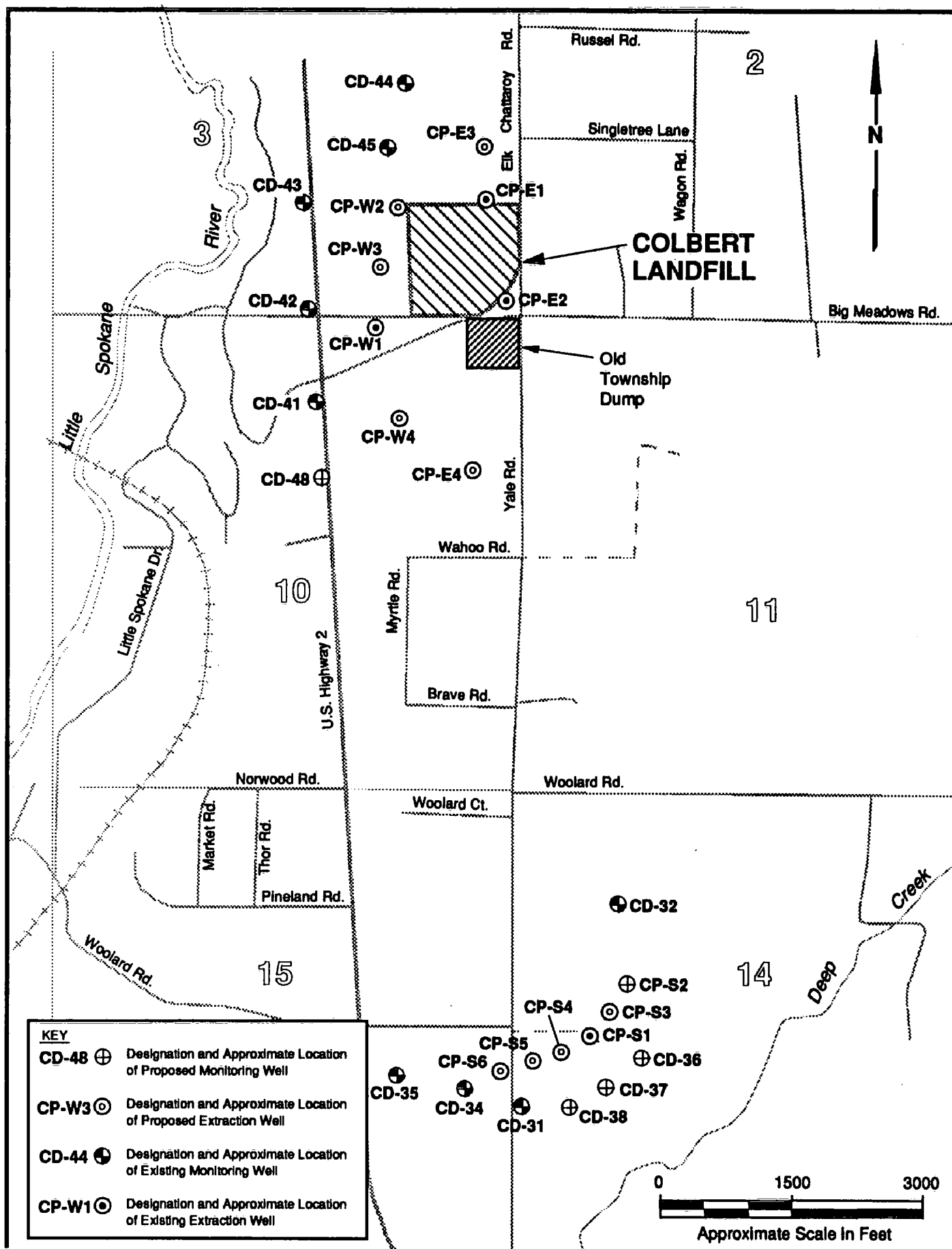


Figure 1.2







Location of Phase II Monitoring and Extraction Wells

Figure 1.5

FORM 1.1
ACKNOWLEDGEMENT

I have read the attached Health and Safety Plan^(a) for the Phase II RD/RA Activities at the Colbert Landfill. I have discussed any questions I have regarding this plan with my supervisor and/or the Site Safety Officer/Field Coordinator, and I understand the requirements.

Employee _____ Date _____

Supervisor _____ Date _____

- _____
(a) A copy of this Health and Safety Plan is to be placed in the support zone trailer and in each field vehicle.

FORM 1.2^(a)

MODIFICATION TO HEALTH AND SAFETY PLAN
PHASE II RD/RA ACTIVITIES
COLBERT LANDFILL

DATE / /

Modification: _____

Reasons for Modification: _____

Signature of Site Personnel Briefed:

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Approvals

Site Safety Officer/Field Coordinator: _____

Project Manager: _____

Others: _____

- (a) The original of this Health and Safety Plan modification form will be filed in the project file. A copy of this form is to be placed with the Health and Safety Plan maintained in the support zone trailer and in each field vehicle.

2.0 HAZARD/RISK EVALUATION

The scope of Phase II RD/RA activities includes: 1) installation and sampling of groundwater monitoring wells and extraction wells near the anticipated perimeter of the contaminant plumes, and 2) construction of the treatment system (stripping tower), and water conveyance system. Most of the wells are located at a distance from the Landfill, although the treatment system will be located near the southwest corner of the Landfill.

The degree of overall hazard depends on the potential for: 1) exposure to toxic chemicals; 2) physical hazards from the use of general construction, drilling, sampling, and testing equipment; 3) physical hazards including debris, uneven terrain, rattlesnakes, poisonous spiders, poor footing, and surface water; 4) extremes of the summer and winter climate in the Spokane area; and 5) the possibility for fire/explosion when drilling or excavating through soil adjacent to the refuse disposal area. The degree of hazard or risk associated with intrusive activities, and the accompanying level of stringency for health and safety procedures varies, depending upon the area where the intensive work is to take place. For example, health and safety procedures will be the most stringent for intrusive work performed in the refuse disposal area⁽¹⁾ and less restrictive for work performed in areas outside of the refuse disposal area. Currently, no intrusive activities are planned in Phase II for the refuse disposal area, where potential worker health risk is greatest. However, because the potential exists for intensive activity in this area, associated health and safety risks and procedures for this area are addressed in this Plan.

Well drilling and general construction activities pose the greatest risk of physical injury during Phase II. To minimize the risk of injury from these activities, the drilling contractor and general contractor will be required to operate all equipment in a safe and appropriate manner. All drilling activities will be conducted in a manner consistent with the recommendations provided in the National Drilling Federation Drilling Safety Guide (NDF 1985). Although not specifically covered by this Plan, all construction activities are to be conducted in compliance with the requirements of 29 CFR 1926 (Federal safety and health regulations for construction) and WAC 296-155 (State safety standards for construction work).

(1) According to Spokane County, an approximate 30-ft buffer zone exists between the refuse disposal area and the Landfill property boundary.

2.1 CONTAMINANT CHARACTERISTICS

Several previous investigations and sampling efforts have been performed to determine the type and concentration of chemical contaminants in groundwater, and in soil samples collected at aquifer depths (between about 80 feet and 180 feet). There is only limited data available on the concentration of the Constituents of Concern in soil within the refuse disposal area of the Landfill.

Information developed during Phase I was used for assessing the hazards and risks outside of the refuse disposal area. These assessments focused on the Constituents of Concern, which are common industrial solvents (or their breakdown products).

The maximum concentrations detected in groundwater for the six Constituents of Concern during Phase I are presented in Table 2.1. Low levels (less than 0.04 ppm) of seven other volatile organic chemicals (chloroform; chloroethane; dichlorodifluoromethane; freon; 1,2-dichloroethane; 1,2-dichloropropane; and vinyl chloride) were also detected, but were less widely distributed.

Several soil samples were collected during the advancement of five borings drilled within the refuse disposal area to approximately 20 feet below the refuse as part of the RI. MC was the only chemical detected in these samples. However, volatile organic compounds other than MC may be present in refuse disposal area soils, since the borings were located outside of areas where the solvents were disposed and the drilling technique (air rotary) may have volatilized organic solvents prior to sampling.

2.1.1 Toxicity

Selected health and safety criteria for the Constituents of Concern are shown in Table 2.2. Vapor pressures are given to provide an indication of the chemicals' tendency to volatilize (the higher the vapor pressure, the more volatile the chemical is). Possible exposure routes include inhalation of vapors, absorption through the skin or eyes, and ingestion. Specific health effects associated with the Constituents of Concern are described below.

1,1,1-Trichloroethane (TCA)

TCA is a colorless, nonflammable liquid with a sweet odor. Target organs include the skin, eyes, cardiovascular system, and the central nervous system. TCA is irritating to the eyes, and repeated skin contact can lead to dermatitis. TCA acts as a narcotic and depresses the

central nervous system. Exposure symptoms include dizziness, uncoordination, and drowsiness. Available data indicate that TCA is not a cancer-causing substance (EPA 1991).

1,1-Dichloroethylene (DCE)

DCE is a liquid with a slight acrid odor at room temperature. Target organs include the respiratory system, eyes, and central nervous system. DCE is irritating to the eyes and other mucous membranes. Exposure symptoms include dizziness, nausea, and intoxication similar to alcohol. DCE is classified as a possible human carcinogen (EPA 1991).

1,1-Dichloroethane (DCA)

DCA is a colorless, clear, flammable liquid with a sweet odor. Target organs include the skin, liver, and kidneys. Exposure symptoms include central nervous system depression, skin irritation, drowsiness, and liver and kidney damage. DCA is classified as a possible human carcinogen (EPA 1991).

Trichloroethylene (TCE)

TCE is a colorless, non-flammable liquid with a sweet odor. Target organs are the respiratory system, heart, liver, kidneys, central nervous system, and skin. TCE vapor irritates the eyes, nose, and throat. Repeated and prolonged skin contact may cause dermatitis. Exposure symptoms include headache, dizziness, nausea, irregular heart beat, drowsiness, and fatigue. TCE is classified as a probable human carcinogen (EPA 1991).

Tetrachloroethylene (PCE)

PCE is a clear, colorless, nonflammable liquid with a sweet odor similar to ether or chloroform. At higher concentrations, the odor tends to become unnoticeable after a short period of time. Repeated skin contact can cause dermatitis. High concentrations may cause eye and nose irritation. Target organs include the liver, kidneys, eyes, upper respiratory system, and central nervous system. Signs and symptoms of overexposure include malaise, dizziness, headache, increased perspiration, fatigue, and decreased mental ability. PCE is classified as a probable human carcinogen (EPA 1991).

Methylene Chloride (MC)

MC is a clear, colorless, liquid with an aromatic odor. Target organs include the skin, cardiovascular system, eyes, and the central nervous system. Repeated contact with MC vapor irritates the eyes and upper respiratory tract. Repeated skin contact may cause dermatitis. Prolonged exposure symptoms include headache, irritability, and numbness and tingling in the limbs. MC is classified as a probable human carcinogen (EPA 1991).

As some of the above exposure symptoms resemble signs of cold or flu, workers should inform the Site Safety Officer/Field Coordinator whenever they are feeling ill. The Site Safety Officer/Field Coordinator will review the work area and previous activities to determine if overexposure may have occurred, and if current safety procedures are adequate.

2.1.2 Potential for Chemical Exposure

All major intrusive construction activities conducted during Phase II will be outside of the refuse disposal area, and most intrusive activities will be at a distance of more than 100 feet from the refuse disposal area. Potentially contaminated soil outside the Landfill boundary (including its 30-ft buffer zone) is limited to the saturated zone, which begins at approximately 80 feet below the ground surface for the upper aquifer. Thus, the soil outside the Landfill boundary, and above the water table, is not considered potentially contaminated outside the Landfill boundary.

Levels of contamination in groundwater outside the refuse disposal area are anticipated to be relatively low (less than about 4 ppm). Consequently, vapor exposure hazards from groundwater or the potential for inhaling contaminated dust are minimal. However, the potential for inhaling chemical vapors or contaminated dust is greater for drilling or excavation within the refuse disposal area and (to a lesser extent) the 30-ft buffer zone immediately adjacent to the refuse disposal area. It should be noted that no exceedances of permissible exposure level (PEL) were detected during Phase I health and safety monitoring, including work performed in the buffer zone adjacent to the refuse disposal area.

Although no construction is anticipated for Phase II within the refuse disposal area, pipeline construction will occur within the buffer zone adjacent to the refuse disposal area. Worker protection measures will be necessary for intrusive activities within this area during Phase II.

In addition, the Old Township Dump, located immediately south of the Landfill, also offers a potential source for chemical exposure. While not specifically evaluated as part of this

Project, available data indicate that chlorinated solvents similar to those disposed of at the Landfill may also have been disposed of at the Old Township Dump. The location of the Old Township Dump is shown on Figure 1.4.

No intrusive activities are anticipated within the Old Township Dump boundary. However, a pipeline will be constructed along the east boundary, adjacent to Yale Road. Worker protection measures applied to the Landfill buffer zone also will be applied during pipeline construction adjacent to the Old Township Dump.

2.2 PHYSICAL INJURY

Field work near drill rigs, trucks, cranes, compressors, pumps, generators, and other construction-related equipment will pose physical hazards associated with heavy equipment operation. Workers will need to be aware of this activity and be prepared to avoid moving equipment. The Site Safety Officer/Field Coordinator will be responsible for notifying utility officials prior to initiating intrusive activities and for verifying that the drilling location is free of underground utilities (i.e., gas, electrical, water, and sewer lines). The general contractor will be responsible for notifying utility officials prior to initiating all other intrusive activities, and for addressing underground utilities encountered during construction in a safe and appropriate manner.

Construction Safety Standards and General Occupational Health Standards provided in Washington Administrative Code (WAC) 296-155 and WAC 296-62, respectively, will be followed. These WAC chapters provide personal health and safety provisions and requirements related to avoiding physical injury as follows:

- WAC 296-155; Construction Safety Standards: This chapter provides general health and safety requirements associated with construction sites and equipment, including:
 - Part A: General safety and health provisions
 - Part B: Occupational health and environmental control
 - Part C: Personal protective and life saving equipment
 - Part D: Fire protection and prevention
 - Part E: Signs, signals, and barricades
 - Part F: Material handling, storage, use, and disposal
 - Part G: Tools - hand and power
 - Part H: Welding and cutting

- Part I: Electrical
- Part J: Ladders, scaffolds, and elevated work platforms
- Part K: Floor openings, wall openings, and stairways
- Part L: Cranes, derricks, hoists, elevators, and conveyors
- Part M: Motor vehicles, mechanized equipment
- Part N: Excavation, trenching, and shoring
- Part O: Concrete, concrete forms, and shoring
- Part P: Steel erection
- Part Q: Tunnels and shafts, caissons, coffer dams, and compressed air
- Part R: Miscellaneous construction requirements
(and others)
- WAC 296-62; General Occupational Health Standards: This chapter provides general rules for occupational health and safety at the workplace, including:
 - Part A: Occupational health and environmental control
 - Part B: Access to records
 - Part C: Hazard communication
 - Part D: Controls and definitions
 - Part E: Respiratory protection
 - Parts F/G: Carcinogens
 - Parts H/I: Air contaminants

2.3 HEAT-RELATED ILLNESSES

Summer temperatures in the Spokane area may at times exceed 100 degrees Fahrenheit (°F). Heat-related illness can cause physical discomfort, loss of efficiency, personal injury, and, in the extreme, can be life-threatening. During periods of extreme hot weather, the Site Coordinator/Site Safety Officer may implement modified work hours, or suspend field activities, until more temperate weather returns.

Construction workers, drillers, and samplers are highly susceptible to heat-related illness when wearing protective clothing, which decreases natural body ventilation and, hence, cooling. Causes of heat-related illnesses include unacclimated workers, lack of physical fitness, being overweight, recent alcohol intake, dehydration, individual susceptibility, and cardiovascular disease. The three most common types of heat-related illness are heat cramps, heat exhaustion, and heat stroke, the symptoms of which are briefly described below.

Heat cramps are caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Symptoms include muscle spasms and pain in the extremities and abdomen. First-aid treatment includes drinking half a glass of salt water (one teaspoon of salt per glass) every 15 minutes over a period of about one hour.

Heat exhaustion is caused by dehydration, or water deficiency. Symptoms include fatigue, nausea, headache, clammy and moist skin, and a pale complexion. First aid treatment includes taking the individual to a cooler environment and administering fluids.

Heat stroke is a life-threatening condition resulting from a failure of the body's temperature regulation ability, which leads to the loss of evaporative cooling and an uncontrolled accelerating rise in body temperature. If heat stroke is suspected, immediate medical attention is necessary. Symptoms of heat stroke include red, mottled, hot, and dry skin. First-aid treatment includes immediate cooling by spraying the individual with cool water or wrapping the individual in a wet sheet and vigorous fanning of the individual to reduce body temperature.

2.3.1 Personnel Monitoring

Prevention of heat-related illness can be accomplished by medically screening workers, allowing workers to slowly acclimate to heat exposure, monitoring workers during sustained heat, and ensuring that ample drinking water is available at all times and is taken frequently during the work day.

The potential for heat-related illness can be drastically reduced by following a work/rest schedule for workers wearing protective gear. The schedule will be determined by the Site Safety Officer/Field Coordinator and will be based on field conditions, level of work effort, and individual reactions.

The Site Safety Officer/Field Coordinator will evaluate the health and physical fitness of field personnel wearing protective gear prior to beginning Project field activities. This may include taking baseline pulse and temperature readings. These readings will provide the basis for comparison if vital sign monitoring becomes necessary during hot weather conditions. A person's body temperature and pulse rate will tend to rise while working in hot weather conditions. Workers who are ill (i.e., cold or flu), have sunburns, or other difficulties should inform the Site Safety Officer/Field Coordinator, as these conditions can affect vital sign readings.

If necessary, at the end of each work period, the workers will remove their protective clothing and the Site Safety Officer/Field Coordinator shall do one or more of the following for each worker:

- (1) Take their oral temperature and proceed as given below:
 - a. Less than or equal to 99° F - no action.
 - b. Greater than 99° F and less than or equal to 99.7° F - cool them off with a water spray and do not allow them to return to work unless their temperature is 99° F at the end of the rest period.
 - c. Greater than 99.7° F and less than or equal to 100.4° F - cool them off with a water spray, double their rest period, and do not allow them to return to work unless their temperature is less than or equal to 99° F. If heat exhaustion or heat stroke symptoms are present, seek medical attention.
- (2) Take their pulse. If their pulse is over 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.
- (3) Check carefully for symptoms of heat illness and react accordingly.
- (4) Have each person slowly drink cool, but not cold, water or diluted unsweetened fruit juice. It is important that fluid intake be regular (suggested intake is approximately 1 cup every 20 minutes).

Prior to each day's field activities, the team will ensure that sufficient drinking water or diluted fruit juice and ample cooling water (in a pressure sprayer) is on-hand. Be sure to keep all fluids and cooling water in the shade. Workers should remove their protective clothing as completely as possible during rest breaks to let the body cool and to help prevent heat rashes.

2.4 COLD-RELATED ILLNESSES

Cold temperatures can also pose health hazards to field workers. Winter temperatures in the Spokane area are known to drop well below freezing. To prevent cold-related health hazards, field activities may be delayed during extreme cold weather. The serious health effects that can result from exposure to cold temperatures include hypothermia and frostbite. Hypothermia results from the lowering of the body's deep core temperature. Body core temperatures below 96.8° F cause reduced mental alertness, reduction in rational decision-

making, and possibly the loss of consciousness (which is potentially fatal). A person with hypothermia should receive medical attention immediately.

Signs of frostbite include sudden whitening of the skin and numbness. Treatment includes warming with blankets, warm compresses, or lukewarm water. Hot water, ointments, or massage should not be used.

Workers should inform the Site Safety Officer/Field Coordinator if their hands, feet, or face feel numb, and workers should monitor each other for patches of pale skin on the face and ears.

Wind chill, or the cooling power of moving air, is of critical importance when evaluating cold exposure to field workers. The potential for frostbite increases with colder temperatures and higher wind speeds. Table 2.3 provides information on determining wind chill.

Pain in the extremities may be the first early warning sign of the onset of cold-related illnesses; one of the last stages is severe shivering. Workers experiencing shivering should inform the Site Safety Officer/Field Coordinator and should go to the heated support zone trailer until they feel that they have totally recovered from the effects of the cold weather. The Site Safety Officer/Field Coordinator should monitor the remaining field team members.

Workers must wear adequate insulating clothing whenever temperatures are expected to be below 40° F. The most difficult areas to keep warm are the hands and feet. Light polypropylene or cotton liner gloves (worn under PVC inner gloves) will be provided during the cold season. Workers may choose to wear leather or another type of heavier outer gloves (rather than the usual neoprene gloves). However, these outer gloves will then be treated as contaminated if they have been used in the refuse disposal or buffer zone areas. In addition, these outer gloves will be left in a clean plastic bag in the support zone area and shall not be taken back to the worker's car or home.

The steel-toe insert in neoprene chemical resistant boots aggravate the problem of cold feet during the winter months. To help alleviate this problem, workers will be provided neoprene boots with oversized steel toe and shank that will accommodate extra wool socks or a felt liner. Workers should not try to wear extra socks inside their normally-sized steel toe and shank boots, as this can lead to reduced circulation, resulting in even colder feet.

Other problems can arise during the cold season (i.e., duct tape may not stick, nitrile outer gloves can freeze, respirator exhalation valves can freeze shut, pens may not write, and decontamination water may freeze). Some of these problems can be eliminated (i.e., using a special tape made for cold weather use, or adding a little antifreeze to the boot wash water);

however, workers and managers should be prepared for tasks taking more time during the winter months.

2.5 FIRE/EXPLOSION

There is the potential for encountering pockets of potentially explosive methane gas (commonly present at landfills) when conducting intrusive activities in the area adjacent to the refuse disposal zone, as well as encountering unknown hazardous materials if intrusive activities are conducted within the refuse disposal zone. Fire extinguishing equipment will be available and easily accessible on each drill rig. This equipment will include dry chemical fire extinguishers and shovels for use in responding to minor fires only. In the event of a major fire or explosion, all personnel will immediately evacuate to a safe area upwind. The Site Safety Officer/Field Coordinator will evaluate the need for further evacuation and/or emergency services.

Catalytic converters on the underside of vehicles are sufficiently hot to ignite dry prairie grass. Workers should avoid driving over dry grass that is higher than the ground clearance of the vehicle, and be aware of the potential fire hazard posed by the catalytic converter at all times. A running vehicle should never be allowed to sit in a stationary position over dry grass or other combustible materials.

2.6 RATTLESNAKES

Rattlesnakes are known to be present in the Spokane area, and although the potential for encountering a rattlesnake is low, workers should be cautious when walking through brush and vegetation. Rattlesnakes are usually 35 to 45 inches long, have a pit between the eye and nostril on each side of a triangular-shaped head, elliptical pupils, and two large fangs. Non-poisonous snakes have round pupils, more rounded heads, and no fangs or pits.

First aid for a snakebite victim includes: 1) transporting the victim to the hospital as quickly as possible; 2) keeping the victim still, calm, and preferably in a lying position; and 3) immobilizing the bitten extremity and keep it at or below the heart level.

2.7 SPIDERS

Black widow spiders have been observed at the Site, and brown recluse spiders are also likely to be present. Both are typically reclusive and prefer warm dark areas for their nests. Care should be taken when disturbing such potential nesting areas. First aid for a black widow, brown recluse, or other venomous spider bite is identical to first aid for a snakebite.

TABLE 2.1

PHASE I MAXIMUM CONTAMINANT CONCENTRATIONS IN GROUNDWATER
COLBERT LANDFILL^(a)

Constituent of Concern	Maximum Concentration (ppb) ^(b)	
	Upper Aquifer	Lower Aquifer
1,1,1-Trichloroethane (TCA)	400	4,200
1,1-Dichloroethylene (DCE)	43	560
1,1-Dichloroethane (DCA)	180	120
Trichloroethylene (TCE)	14	580
Tetrachloroethylene (PCE)	ND ^(c)	2.9
Methylene Chloride (MC)	14	4,400

(a) Landau Associates (1991).

(b) ppb = parts per billion; equivalent to micrograms per liter ($\mu\text{g/L}$).

(c) ND = not detected in any well in aquifer.

TABLE 2.2
SITE EXPOSURE ASSESSMENT
COLBERT LANDFILL

Chemical Constituent	Abbreviation	Maximum Concentration in Groundwater (ppb) ^(a)		Health and Safety Criteria		
		Upper Aquifer	Lower Aquifer	Exposure Limit In Air ^(b) (ppm)	IDLH ^(c) (ppm)	Vapor Pressure mm ^(d)
1,1,1-Trichloroethane	TCA	400	4,200	350	--	100
1,1-Dichloroethylene	DCE	43	560	1.0	--	--
1,1-Dichloroethane	DCA	180	120	100	4,000	230 ^(e)
Trichloroethylene	TCE	14	580	50	1,000	100
Tetrachloroethylene	PCE	ND ^(f)	2.9	25	500	16
Methylene Chloride	MC	35	4,400	100	5,000	380

(a) ppb = parts per billion; equivalent to micrograms per liter (µg/L).

(b) Washington State Permissible Exposure Levels (PELs), as provided in WAC 296-62 (May 1989); expressed in parts per million (ppm); equivalent to milligrams per liter (mg/L).

(c) IDLH = Immediately Dangerous to Life and Health (NIOSH; U.S. Dept. of Health and Human Services 1990).

(d) mm = millimeters of mercury. Vapor pressure will increase with temperature. From Dangerous Properties of Industrial Materials, 5th edition, Sax, 1989, except as noted otherwise.

(e) From NIOSH Pocket Guide to Chemical Hazards (U.S. Dept. of Health and Human Services 1990).

(f) ND = Not Detected.

TABLE 2.3
COOLING POWER OF WIND ON EXPOSED SKIN*

Estimated Wind Speed (in mph)	Actual Temperature Reading (Degrees F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature Reading (Degrees F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148

(Wind speeds greater than 40 mph have little addi- tional effect.)	LITTLE DANGER	INCREASING DANGER	GREAT DANGER
	In < hr with dry skin skin. Maximum danger of false sense of security.	Danger from freezing of exposed skin within one minute.	Skin may freeze within 30 seconds.

* Expressed as an equivalent temperature under calm conditions. Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA., as cited by the American Council of Hygienists, 1990-1991 Threshold Limit Values.

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3.0 WORK AREAS

This section presents descriptions of the designed controlled access zones to be established around areas where intrusive activities will occur during Phase II RD/RA construction. Intrusive activities are not anticipated to occur in the refuse disposal area. Therefore, only industrial work zones (established around intrusive activities outside the refuse disposal area) are anticipated under Phase II. However, since some minor potential still exists for intrusive activities to occur within the refuse disposal area during Phase II construction, the establishment of the more stringent concentric controlled access zones around such intrusive activities may be required. Therefore, refuse disposal area controlled access zones (exclusion zones, contaminant reduction zones, and support zones) are also described in this section. Work area designations only apply to drilling activities. General construction activities are subject to the construction safety standards discussed in Section 2.2.

3.1 INDUSTRIAL WORK ZONE

Chemical exposure hazards are suspected to be minimal for intrusive activities conducted outside of the refuse disposal area. However, physical hazards posed by the use of heavy equipment (e.g., drill rigs, compressors, etc.) warrant the institution of controlled access to any of these work areas. Therefore, an industrial work zone, designated with caution tape or traffic cones, will be instituted within 50 ft of Phase II intrusive activities conducted outside of refuse disposal areas. When working adjacent to public roads, work zone boundaries may be modified to allow continued traffic flow. Only field team members will be allowed in this industrial work zone. Protective clothing requirements in the industrial work zone are less stringent than those in the zones (described below) that would be established around intrusive work in the refuse disposal area (Section 6.0).

3.2 EXCLUSION ZONE

The exclusion zone is the area in which the highest hazard level exists. The exclusion zone will be an area within a 50-ft radius immediately surrounding any borehole or monitoring well located within the refuse disposal area. The exclusion zone will be designated with traffic cones or caution tape. Only field team members will be allowed in the exclusion zone. Protective gear (including full-face respiration, as described in Section 6.0 of this plan) will be required in those areas of the zone where air monitoring results indicate unacceptably high

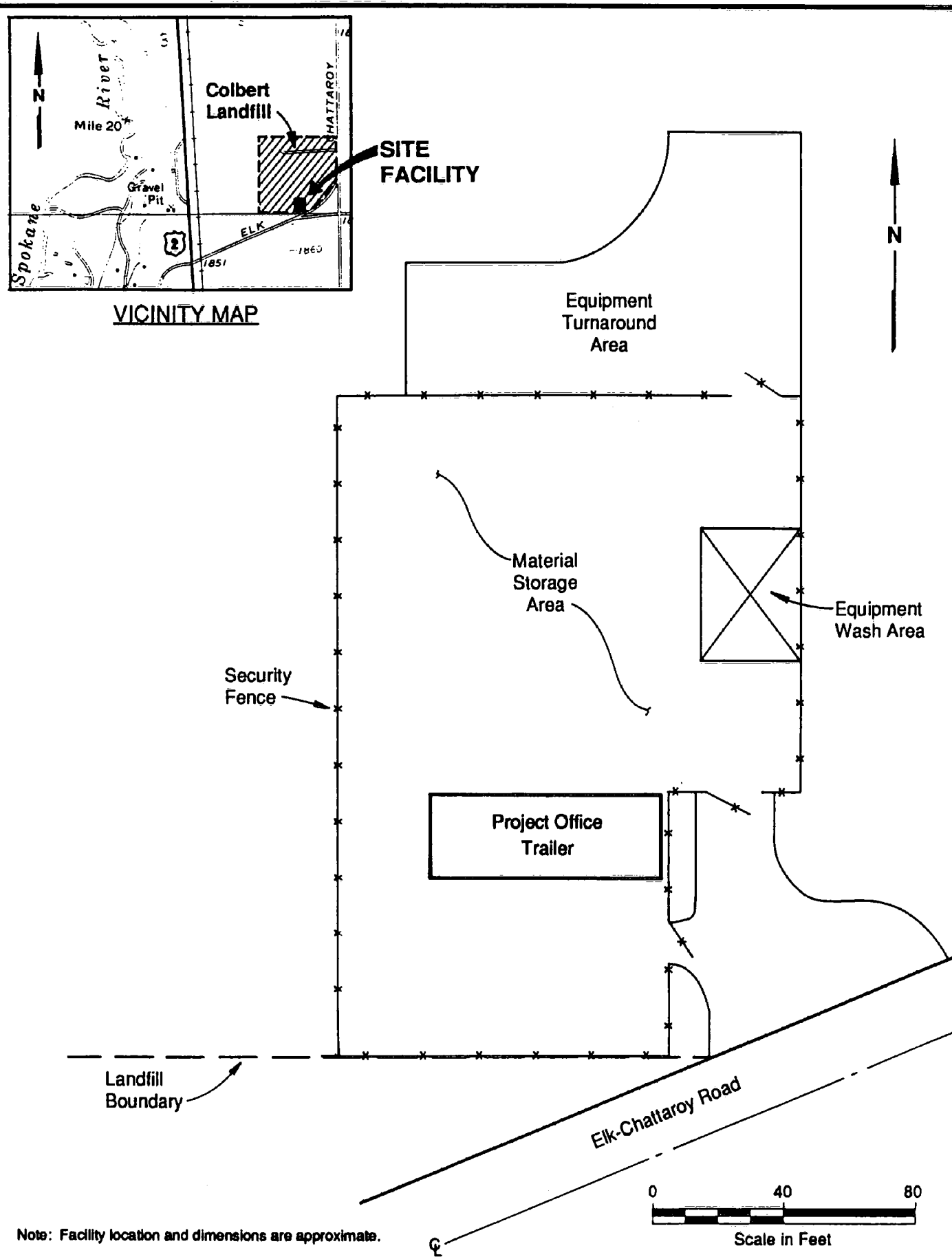
levels of volatile organic compounds (see Section 5.0, Table 5.1). As described for the industrial work zone, the boundaries of the exclusion zones may be modified to allow traffic flow along public roads, provided that doing so does not expose the public to health or safety risks.

3.3 CONTAMINATION REDUCTION ZONE

The contamination reduction zone will consist of the 10-ft wide area located between the 50 and 60 ft radii from a monitoring well or borehole located within the refuse disposal area, and will be established for both personnel and equipment decontamination. This zone will be used to prevent the transfer of contaminants to the support zone, and will be equipped with garbage bags, decontamination solutions, and other supplies. All potentially contaminated materials will be placed on plastic sheeting. Personnel will follow the decontamination procedures specified in Section 7.0 of this Plan. As described for the industrial work zone and exclusion zone, the boundaries of the contamination reduction zone may be modified to allow traffic flow along public roads, provided that doing so does not pose a threat of exposure or injury to the public.

3.4 SUPPORT ZONE

The support zone covers all areas outside of the contamination reduction zone and includes the Project support zone (which will be established for the duration of Phase II construction for the Project) and the field support zone (car or van at a distance from the Project support zone). The Project support zone will be located as indicated on Figure 3.1. The Project support zone will provide a secure area for clean equipment storage, an equipment wash area, and parking. Personnel rest and eating facilities and a telephone will be provided in the Project office trailer. Shower facilities will also be provided in the Project office trailer.



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Project Support Zone Layout

Figure 3.1

4.0 SITE SECURITY

Site security will be the responsibility of the Site Safety Officer/Field Coordinator. Access to the Project support zone will be controlled by security gates. These gates will be closed during non-working hours.

All site visitors must be approved by the Project Manager or the Site Safety Officer/Field Coordinator. Visitors will be allowed to observe operations from the support zone only, and must obey all instructions of the Site Safety Officer/Field Coordinator. Individuals entering the work zones (other than the support zone) to work in potentially contaminated areas must complete the training and medical monitoring (discussed in Sections 10.0 and 11.0 of this Plan) prior to admittance.

Field team members will also be responsible for preventing unauthorized individuals from entering the industrial work, exclusion, or contamination reduction zones at drilling or sampling locations where contamination is suspected to be present. As public and news media interest in this Project has been high in the past, field team members should be prepared to advise onlookers to maintain a safe distance from intrusive activities. Field team members should direct the press to the Spokane County Utilities Department representative, or to the Site Safety Officer/Field Coordinator. Answers to questions posed by property owners should be limited to providing a description of the work that the field team is about to perform. Questions requiring interpretation or value judgements should be directed to the Spokane County Utilities Department representative or the Site Safety Officer/Field Coordinator.

At the end of each day's intrusive activities, boreholes or monitoring wells will be secured with a lock if possible, or by using the drill rig to place an immovable object over the opening. Equipment should be stored in a secure area each evening.

5.0 AIR MONITORING FOR RESPIRATORY PROTECTION

Inhalation is one of the potential routes of exposure to chemical toxicants, particularly for volatile organic compounds (such as those known to be present). The level of respiratory protection required for workers performing intrusive activities in contaminated or potentially contaminated areas will be determined based on the location of these activities (with respect to the Landfill), and the concentration of organic vapors measured near the work site during these intrusive activities.

Monitoring for organic vapors will be accomplished within the worker breathing zone using a photoionization detector (PID). The PID is a portable instrument that measures the concentration of ionizable compounds in air. The PID will be configured with a 10.6-electron volt ultraviolet lamp, which is sufficient to ionize most of the volatile organic chemicals previously detected in the groundwater (see Table 2.1) and which may be present in the atmosphere around intrusive activities. MC cannot be detected with standard field photoionization equipment. However, since the Permissible Exposure Level (PEL) for MC is relatively high (see Table 2.2), and during previous investigations it has only been present in combination with other "detectable" compounds, the use of field monitoring equipment capable of detecting MC is not considered necessary for Phase II construction work. DCE has a PEL of 1.0 ppm and cannot be reliably detected at that concentration with a PID. However, the maximum concentration of DCE detected onsite was 0.5 ppm in groundwater near the center of the Landfill. Therefore, based on the results of previous sampling, DCE is not considered to present an inhalation hazard at the concentration present onsite, and the use of field monitoring equipment capable of detecting DCE is not considered necessary for Phase II construction work. If significant concentrations (above 20 ppm) of volatile organic compounds are detected by the PID, other field monitoring equipment (i.e. detector tubes) will be used to ensure that MC and DCE are not present in concentrations approaching the PEL.

Air monitoring for total particulates or airborne dust levels will not be performed because soil samples collected during the RI did not reveal appreciable levels of contamination. However, physical dust control methods will be used (especially during air rotary drilling, if used). These dust control methods include wetting disturbed soil, and/or covering the rotary drill rig cutting hose and keeping it securely tied down as far downwind from workers as possible.

A Combustible Gas Indicator (CGI) will be used to monitor the atmosphere for potentially explosive methane gas near, and in boreholes installed in, the refuse disposal area, and in areas of intrusive work conducted within 50 ft of the refuse disposal area or the Old Township Dump (including pipeline trenches). The CGI will provide results as a percentage of the Lower Explosive Limit (LEL).

Backup instrumentation will be maintained onsite to ensure availability. The calibration of the PID and CGI will be checked each morning, and after each day's work. The instruments will not be recalibrated at the end of the day; however, the results of the calibration check will be recorded. These results will be recorded for the duration of Project construction.

5.1 ACTION LEVELS

Table 5.1 lists action levels for the Project that will trigger an upgrade of respiratory protection, or when area evacuation is necessary due to the presence of explosive gases. Workers will evacuate the area if the CGI indicates readings of over 20 percent of the LEL. Workers will allow the gases to vent and dissipate for at least 30 minutes before returning to take another reading with the CGI.

An action level of 25 ppm has been established for volatile organic vapors. The 25 ppm action level is the PEL for TCE. Action levels will not be based on DCE, which has the lowest PEL of all constituents detected onsite, because of its low detected concentrations. Respiratory protection will be required if breathing zone organic vapor reading exceed 25 ppm for over one minute, or exceed 50 ppm for a momentary peak.

All personnel who will be conducting intrusive work in the refuse disposal area will provide documentation of a successful fit test with a full-face respirator prior to beginning work. Subcontractors will be responsible for fit-testing their own employees. Respirators will be placed in clean plastic bags and stored in the work zone for easy access if they are needed.

A full-face respirator, equipped with organic vapor and high-efficiency particulate cartridges, provides a protection factor of 100. Thus, it may be worn in concentrations up to 100 times those established above. Field conditions are not expected to result in concentrations that reach or exceed this 100 protection factor level, conditions that would require use of an supplied air respirator (Level B protection). If conditions are encountered which would warrant Level B protection, the work area will be evacuated until concentrations fall below the action level for evacuation (Table 5.1).

TABLE 5.1

ACTION LEVELS FOR RESPIRATORY PROTECTION
COLBERT LANDFILL

Monitoring Parameter	Reading ^(a)	Level of Protection
Combustible Gas (during intrusive activities in the refuse disposal and work areas within 50 ft of the refuse disposal area)	10-20% of Lower Exposure Limit (LEL)	Continue onsite monitoring with extreme caution as higher levels are encountered
	> 20% LEL	Explosion hazard; withdraw from area immediately
Organic Vapors ^(b) (during all intrusive activities within the refuse disposal area)	0-15 ppm over background ^(c)	Level D (modified)
	15-100 ppm over background	Level C: Full-face air purifying respirator equipped with organic vapor and high efficiency particulate cartridges
	>100 ppm over background	Withdraw from area immediately

(a) Sustained readings over a one minute duration.

(b) Determine using a PID or other appropriate organic vapor detector.

(c) Background readings obtained 50 ft upwind of site activity.

6.0 PERSONAL SAFETY EQUIPMENT

Levels of protection have been defined by the EPA in the Standard Operating Safety Guides (EPA 1984). The levels of protection that will be needed are described below.

6.1 LEVEL D

Level D protective equipment may be worn when there is no potential for splashing or unexpected inhalation of chemicals. Level D equipment includes:

- Hard hat when working around construction or moving equipment
- Safety glasses when working around construction or moving equipment
- Long-sleeved shirt and long-pants, or coveralls
- Gloves (neoprene or PVC gloves must be used when handling potentially contaminated items such as sample bottles or equipment)
- Boots/shoes with leather or chemical-resistant steel (or impact-resistant plastic) toe and shank.

Level D equipment may be worn during the following activities:

- During non-intrusive construction work in all areas
- During the first 60 ft of drilling outside the Landfill boundary (including the buffer zone) where contamination is limited to the saturated zone beneath the ground surface
- During intrusive work (other than drilling) within the 30-ft buffer zone adjacent to the refuse disposal area, provided air monitoring in excavation does not detect organic vapors above background.

6.2 LEVEL D (MODIFIED)

Level D equipment (modified) will be worn when a higher degree of dermal or skin protection is needed and respiratory protection is not needed. For intrusive work performed outside of the refuse disposal area at depths greater than 60 ft, Level D (modified) protective equipment will be required; however, contaminated vapor and dust exposure levels are expected to be minimal. Level D (modified) equipment includes:

- Hard hat (a splash shield will be used when a high splashing potential is present)
- Safety glasses

- One-piece disposable coveralls, hereafter referred to as "Tyvek" (saran or poly-coated Tyvek when needed for greater splash protection, or when raining)
- Thin PVC inner-disposable gloves
- Outer-disposable gloves (leather outer gloves may be worn, but gloves will be treated as contaminated if used in the exclusion zone)
- Boots with chemically resistant neoprene steel (or impact-resistant plastic) toe and shank
- Boot to Tyvek and glove to sleeve seams must be sealed with duct tape when drilling within the refuse disposal area.

Level D (modified) equipment may be worn during the following work activities:

- Drilling within the 30-ft buffer zone adjacent to the refuse disposal area
- During intrusive work (other than drilling) within the 30-ft buffer zone adjacent to the refuse disposal area, if air monitoring in excavations detects organic vapors above background
- Drilling at more than 60 ft below the ground surface at locations outside the refuse disposal area and 30-ft buffer zone
- Installing and developing wells
- Conducting minor intrusive work within the refuse disposal area (to depths less than depth of disposed refuse; encountered approximately 2-4 ft below present grade)
- Taking water level readings (eye protection required when deconning tape)
- Collecting groundwater samples (eye protection required when taking flow readings while purging well, and whenever the potential for splashing exists)
- When pressure washing.

Periodic (approximately once per hour and more frequently when necessary) air monitoring is required during these activities.

6.3 LEVEL C

Level C protection differs from Level D (modified) protection in that it affords a higher degree of respiratory protection. Air-purifying respirators are worn to reduce atmospheric contaminant levels before air enters the lungs. Level C protective equipment includes:

- Level D (modified) equipment (saran or poly-coated Tyvek) required when conducting intrusive work in the refuse disposal zone, and taped glove to Tyvek and boot to Tyvek seams whenever Level C is required
- Full-face respirator with high-efficiency particulate and organic vapor cartridges (MSHA/NIOSH approved).

Level C protection will be required for intrusive activities within the refuse disposal area where substantial volumes of disposed waste may actually be encountered (depths of 2-4 ft below ground surface or greater), or any areas where air quality monitoring indicates concentrations in excess of action levels listed in Section 5.0, Table 5.1, outside the refuse disposal area. Air monitoring during drilling is required about every ½ hour to a depth of about 90 ft, and about every hour at greater depths.

7.0 DECONTAMINATION

Workers leaving the industrial work zone (designated work area at locations outside the perimeter of the refuse disposal area) will remove disposable clothing and gloves. These items will be disposed of daily and will be treated as non-contaminated trash.

Strict decontamination procedures are required for intrusive work performed within the refuse disposal area. In these areas, all personnel and equipment must be properly decontaminated before entering the support zone from the exclusion zone.

7.1 REFUSE DISPOSAL AREA PERSONNEL DECONTAMINATION PROCEDURES

A decontamination area will be set up in the contamination reduction zone. Before commencing work, all personnel will be trained by the Site Safety Officer/Field Coordinator in decontamination procedures. Personnel decontamination will be as follows:

- Step 1: Place equipment on plastic sheeting just inside contamination reduction zone.
- Step 2: Discard outer gloves.
- Step 3: Wash and rinse boots.
- Step 4: Decontaminate equipment with disposable wetted rags. Place disposables in receptacles.
- Step 5: Remove Tyvek. Place disposables in receptacles.
- Step 6: Remove, wash, rinse, and sanitize respirator (if used).
- Step 7: Discard inner gloves.
- Step 8: Enter support zone.
- Step 9: Wash hands and face.
- Step 10: Workers should shower in the Project office trailer or immediately upon returning home.

7.2 EMERGENCY DECONTAMINATION

In case of an emergency, gross decontamination procedures will be implemented as rapidly as possible. Portable eye washes will be available in the first-aid kits maintained for each command post (i.e., van or trailer) located within the field support zone. Portable water sprayers will be available in all contamination reduction zones. If a life-threatening injury occurs that results in the individual becoming highly contaminated, and the injured individual cannot undergo decontamination procedures without incurring additional injuries or risk, the

individual will be transported wrapped in plastic sheeting. The medical facility will be: 1) informed that the injured individual has not been decontaminated and, 2) given information regarding the most probable contaminants.

7.3 RESPIRATOR DECONTAMINATION

Certain parts of contaminated respirators, such as the harness assembly or cloth components, are difficult to decontaminate. If grossly contaminated, these parts will be discarded. Rubber components will be soaked in soap and water and scrubbed with a brush. Respirators will be sanitized by rinsing them in a detergent solution followed by several clear rinses, before hanging them to dry.

Each person will be responsible for decontaminating their own respirator at the end of each day of use, and will be trained in respirator maintenance as part of the health and safety training program.

7.4 SAMPLING EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated prior to, and at the end of, sampling activities. Sampling equipment decontamination includes a tap water rinse, an Alconox wash, another tap water rinse, and a final rinse with distilled water. Sampling equipment used outside the refuse disposal area will be decontaminated primarily to prevent cross-contamination, since soil and water in these areas are considered non-hazardous.

7.5 HEAVY EQUIPMENT DECONTAMINATION

Drilling equipment, and heavy equipment used for intrusive activities within refuse disposal area, will be decontaminated at the project support zone. As described above for sampling equipment, decontamination of drilling equipment is primarily to prevent cross-contamination between borings. Particular care will be taken in decontaminating heavy equipment parts that have come into direct contact with contaminants.

For wet decontamination procedures, high-pressure hot water cleaning will be used. Physical scrubbing with disposable brushes will be used when necessary to loosen materials.

The equipment decontamination area will be established downwind of field workers, if possible. Workers should stand as far away from the steam plumes as possible, as steam will tend to entrain potentially contaminated particulates.

7.6 DISPOSAL OF CONTAMINATED FLUIDS AND MATERIALS

All equipment and materials used for decontamination of personal protection will be cleaned or collected for appropriate disposal. All non-disposable clothing and equipment will be decontaminated. Disposables will be containerized. Equipment decontamination water, drilling water, and well purge water will be screened for organic vapors by passing a PID over the water's surface. If readings above background are detected, air will be bubbled through the water to remove residual volatile organics. Once the residual volatile organics have been removed, the water will be considered non-hazardous and disposed of at the work station.

Soil cuttings from the refuse disposal area will be disposed of in the refuse disposal area. Soil cuttings from outside this area will be screened for organic vapors in a manner similar to that described above for water. If readings above background are detected, the cuttings will be disposed of in the refuse disposal area. Otherwise, cuttings will be considered non-hazardous and may be disposed of at the work site, if appropriate, or in the refuse disposal area.

7.7 HOUSEKEEPING

Work areas will be kept clean and orderly. Ordinary refuse will be placed in suitable trash containers. Extraneous materials will be minimized within the exclusion zone (if applicable) as this increases the decontamination load and introduces possibilities for cross-contamination.

8.0 SAFETY RULES AND PROCEDURES

Safety is the responsibility of every individual involved with the Project. Whether in the office or field, properly followed procedures are essential for personal safety and to minimize lost time due to injuries or accidents involving equipment.

8.1 OVERALL SAFETY RULES

All personnel working in contaminated or potentially contaminated environments onsite will follow these rules and procedures:

- All personnel must comply with established safety procedures. Any employee who does not comply with any provision of this Health and Safety Plan may be immediately dismissed.
- Working under the influence of intoxicants, narcotics, or controlled substances is prohibited.
- Personnel taking prescription medicine should inform the Site Safety Officer/Field Coordinator if the medication is suspected to impair the worker's abilities, and if the medication must be taken at specific times during the day. Personnel may not take medicine in areas other than the support zone.
- Only properly trained and licensed drillers or driller's assistants will be allowed to climb or stand on drilling machinery, unless otherwise authorized by the Site Safety Officer/Field Coordinator. Other individuals (i.e., samplers and air monitoring personnel) will stand at a safe distance from the drill rig when it is operating. All personnel should remain alert and prepared to avoid moving equipment.
- Long hair must be tied back and contained inside a hard hat when working around moving machinery.
- Special care should be taken around drill rigs, compressors, and pumps, as protective clothing, fingers, or hair can be caught in moving parts. Also, machinery such as the compressor and generator may become extremely hot during use.
- Ear plugs should be used when working around loud machinery and when reduced hearing would not present a hazard (i.e., well development, and purging).
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the exclusion and industrial work zones.
- Smoking is allowed in designated areas of the support zone only.

- Meals will be eaten only within the support zone.
- Whenever possible, field team activities will be staged upwind of the drill rig and monitoring wells. The air rotary drill cutting outlet will be placed as far downwind from field workers as possible.
- Whenever possible, walking through puddles, mud, or across any discolored ground surface in the refuse disposal area or buffer zone is to be avoided. If work is to be performed inside the refuse disposal area, kneeling, leaning, sitting, or placing equipment on potentially contaminated drums, containers, vehicles, or the ground is prohibited.
- Care will be exercised when proceeding on foot through uneven terrain, and workers should remain alert as rattlesnakes are sometimes found in the area.
- Exchange of personal protective equipment will not be allowed.
- If any physical discomfort is experienced (abnormalities, light-headedness), immediately stop work, tell your co-workers, and leave the exclusion zone together.
- If any personal protective equipment fails, proceed immediately to the contamination reduction zone.
- At least two persons must be present in the exclusion zone at all times while it is occupied.

8.2 BEFORE LEAVING THE PROJECT OFFICE TRAILER

- Prior to leaving the Project office trailer, review Project information updates. These will provide important information concerning:
 - Expected hazards
 - Special conditions
 - Sampling procedures
 - Location of phone
 - Emergency medical information
 - Level of personal protection required
- Finish eating and extinguish cigarettes
- Attend safety briefing and worker question-and-answer period
- Check safety gear and equipment.

8.3 BEFORE ENTERING THE EXCLUSION ZONE

- Prior to entering the exclusion zone, place sample containers in field sample carrier
- Check location of portable first-aid kit, two-way radio, fire extinguisher, and water supply
- Conduct daily inspection of primary personal safety equipment for damage or wear, and replace or repair faulty equipment before re-entering the exclusion zone. Workers will assist each other in this inspection.
- Lay out and check alternate safety gear (first-aid kit, and extra clothing) daily for tears or malfunctions. Immediately repair or replace any damaged or missing gear or equipment.

9.0 EMERGENCY RESPONSE PROCEDURES

9.1 EMERGENCY COMMUNICATIONS

9.1.1 Location of Nearest Phone

A telephone will be located in the support zone at the Project office trailer. Numbers of emergency facilities and personnel will be located adjacent to the telephone.

9.1.2 Air Horn

An air horn will be located in each vehicle and at the Project office trailer, and will be used in the following manner:

<u>Blasts</u>	<u>Meaning</u>
1 long (L)	Evacuate zone immediately.
2 short (S)	Localized problem (not dangerous to workers). Workers move to contamination reduction zone for further instructions.
L/S/L/S	Need help at work location.
2 L	All clear. Resume work.

9.1.3 Two-Way Radios

Portable two-way radios or cellular telephones will be used at each field team location to communicate with the Project office trailer and other field team members.

9.1.4 Wind Direction Indicators

Wind direction indicators will be located at each work area. In an emergency situation, workers should check the wind direction indicator and then evacuate in the upwind direction.

9.1.5 Hand Signals

Hand signals will be established and standardized among all workers. Each worker will immediately inform co-workers of dangerous situations. The following hand signals will be used by team members:

Signal

Thumbs up

Thumbs down

Hands on Waist

Hands on Throat

Rotating hands above head

Rotating hands to the side

Meaning

Okay

Not okay

Exit exclusion zone

Cannot breath

Need help

Situation under control

9.2 ONSITE EMERGENCY EQUIPMENT

An Industrial First-Aid Kit, including a description of CPR and other emergency first aid, a portable air horn, and an eyewash kit will accompany each field vehicle.

9.3 OFFSITE EMERGENCY SERVICES

Phone numbers for offsite emergency services are listed inside the front cover page of this Plan. Copies of the emergency numbers will be located in each vehicle and at the Project office trailer.

9.4 NON-LIFE THREATENING INJURIES

In emergency situations that are not life-threatening (e.g., a broken leg), some decontamination procedures may be modified according to the specific circumstances. The victim should be moved outside the exclusion zone and outer protective clothing should be removed, if doing so would not cause delays or aggravate the injury. Respirators should only be removed: 1) if the victim has stopped breathing, or 2) after the victim has been removed from a breathing hazard area. Normal decontamination procedures should be followed when possible.

Bodily injuries that occur as a result of an accident during operations will be handled in the following manner:

- The victim will be moved outside of the exclusion zone and will be administered to by an individual who holds current first-aid and/or CPR certifications utilizing the emergency equipment onsite (Project office trailer or field vehicles).
- The local first-aid squad/rescue unit, a local hospital, and the Site Safety Officer/Field Coordinator will be notified depending on the nature of the emergency.

9.5 EVACUATION

The Site Safety Officer/Field Coordinator will be responsible for determining if circumstances exist that require re-evaluation and/or evacuation, and should always assume worst-case conditions until proven otherwise. Specific evacuation procedures and warning signs and signals will be covered in the health and safety training session prior to beginning work. Two levels of evacuation have been considered: 1) withdrawal from the immediate work area onsite, and 2) evacuation of the surrounding area.

9.5.1 Work Area

Withdrawal to a safe upwind location will be required under the following circumstances:

- Detection of volatile organics and/or toxic gases at concentrations above action levels for the level of protection being worn (see Section 5.1)
- Occurrence of a minor accident -- field operations will resume after first-aid and decontamination procedures have been administered
- Malfunction or failure of protective equipment, clothing, or respirator.

9.5.2 Surrounding Area

There are no foreseeable conditions, based on current knowledge, that would require evacuation of the surrounding area. The Site Safety Officer/Field Coordinator will be responsible for determining if circumstances exist for area-wide evacuation, and should always assume worst-case conditions until proven otherwise. Fire and police departments must be contacted. A list of emergency response individuals familiar with Project work, including addresses and telephone numbers (inside cover page), will be located at the Project office trailer, and will be carried by the Site Safety Officer/Field Coordinator. If evacuation is necessary, it will be implemented with the assistance of these emergency response personnel.

9.6 ACCIDENT/INCIDENT REPORTING PROCEDURES

Procedures for reporting accidents/incidents are listed below. They will be performed in the order indicated.

- (1) Call appropriate emergency services numbers (ambulance, fire, etc.). Provide information specified on page 1 of this Health and Safety Plan.

- (2) The Site Safety Officer/Field Coordinator will complete a written accident/ incident report using Form 9.1, within 24 hours, sending copies to the persons listed below:

Distribution of Accident/Incident Reports:

Project Manager

Spokane County Utilities District Project Manager

The information provided in the "Employee Exposure/Injury Incident Report" is not to be released under any circumstances to parties other than those listed in this section, bona fide emergency response team members, or appropriate regulatory agency personnel.

FORM 9.1
EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT
(Use additional page if necessary)

Date: _____ Time: _____

Name: _____ Employer: _____

Site Name and Location: _____

Site Weather (clear, rain, snow, etc.): _____

Nature of Illness/Injury: _____

Symptoms: _____

Action Taken: Rest _____ First Aid _____ Medical _____

Transported by: _____

Witnessed by: _____

Hospital's Name: _____

Treatment: _____

Comments: _____

What was the person doing at the time of the accident/incident? _____

Personal Protective Equipment Worn: _____

Cause of Accident/Incident: _____

What immediate action was taken to prevent recurrence: _____

Additional Comments:

Employee's Signature: _____

Supervisor's Signature _____

_____ Date

_____ Date

Site Safety Officer/Field Coordinator Signature _____

_____ Date

Distribution: 1) Project Manager, 2) Spokane
County Utilities District Project Manager

10.0 TRAINING

All personnel performing well construction or sampling tasks, intrusive tasks within the refuse disposal area or intrusive tasks in other areas where health and safety monitoring indicate personnel protection above Level D is required, shall have completed formal training that complies with 29 CFR 1910.120 and WAC 296-62-3040 (certificates of successful completion of training will be maintained in onsite job files), and shall verify on-the-job training for those tasks they are assigned to perform. All operations will be reviewed and all unfamiliar operations will be rehearsed prior to performing the actual procedure. Training will be conducted by a qualified safety professional.

Orientation training will be held prior to beginning drilling or intrusive work within the refuse disposal area. The initial training will be supplemented, as necessary, in subsequent safety meetings. Orientation training will include:

- Health effects and hazards of the chemicals identified or suspected to be present.
- Personal protection requirements.
- Personal hygiene (beards, etc.).
- Use, care, maintenance, and fitting of personal protective equipment, including air purifying respirators. Training in respiratory equipment use will conform to ANSI Z88.2(1980) and 29 CFR 1910.134, which establishes the necessity, effectiveness, and limitations of respiratory equipment.
- Decontamination procedures.
- Accepted practices for entry, exit, and activities within specified areas, including prohibition of food consumption and smoking within the exclusion and contamination reduction zones.
- Emergency response procedures as specified in Section 9.0.
- Review and assessment of equipment.
- Review of job descriptions and assignments.
- Medical requirements.

Written documentation (Form 10.1) of training will be required from all Project personnel and will be maintained by the Site Safety Officer/Field Coordinator.

A Health and Safety Logbook will be maintained for recording events relating to worker health and safety. Issues discussed during safety briefings and any pertinent activities or conversations will be recorded in the log book.

FORM 10.1

TRAINING RECORD

Employee Name: _____

Address: _____

Phone: _____

Company: _____

Training:

(List all successfully completed Health and Safety Training)

Date	Location	Trainer	Hrs.	Title/Subject Matter
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Age Group	Percentage
18-24	10%
25-34	20%
35-44	25%
45-54	20%
55-64	15%
65-74	10%
75-84	5%
85+	5%

Age Group	Total	Male	Female	Male	Female
18-24	28.0%	28.0%	28.0%	28.0%	28.0%
25-34	22.0%	22.0%	22.0%	22.0%	22.0%
35-44	18.0%	18.0%	18.0%	18.0%	18.0%
45-54	12.0%	12.0%	12.0%	12.0%	12.0%
55-64	8.0%	8.0%	8.0%	8.0%	8.0%
65+	2.0%	2.0%	2.0%	2.0%	2.0%

[illegible]

Table 1 Summary of the study design and participant characteristics

100

100

I certify that I have successfully completed the training programs listed above.

Signature: _____

Date: _____

11.0 ROUTINE HEALTH CARE AND MONITORING

A baseline medical evaluation and an annual update exam will be required for all contractors and subcontractors providing drilling services, performing intrusive activities in the refuse disposal area, or intrusive tasks in other areas where health and safety monitoring indicate personnel protection above Level D is required. Annual exams must be maintained throughout the Project for these personnel. Follow-up examinations are appropriate if exposures are known or suspected to have occurred. Documentation of medical evaluations (including medical clearance for respirator use) will be maintained by the Site Safety Officer/Field Coordinator for all workers performing intrusive activities in the refuse disposal area.

12.0 REFERENCES

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